



“ΕΔΙΖΗΣΑΜΗΝ ΕΜΕΩΥΤΟΝ”

(“I searched for myself” – Heracletus)



Andreas Papaefstathiou



CERN Theory Group @ Les Houches, 5-7th November 2014

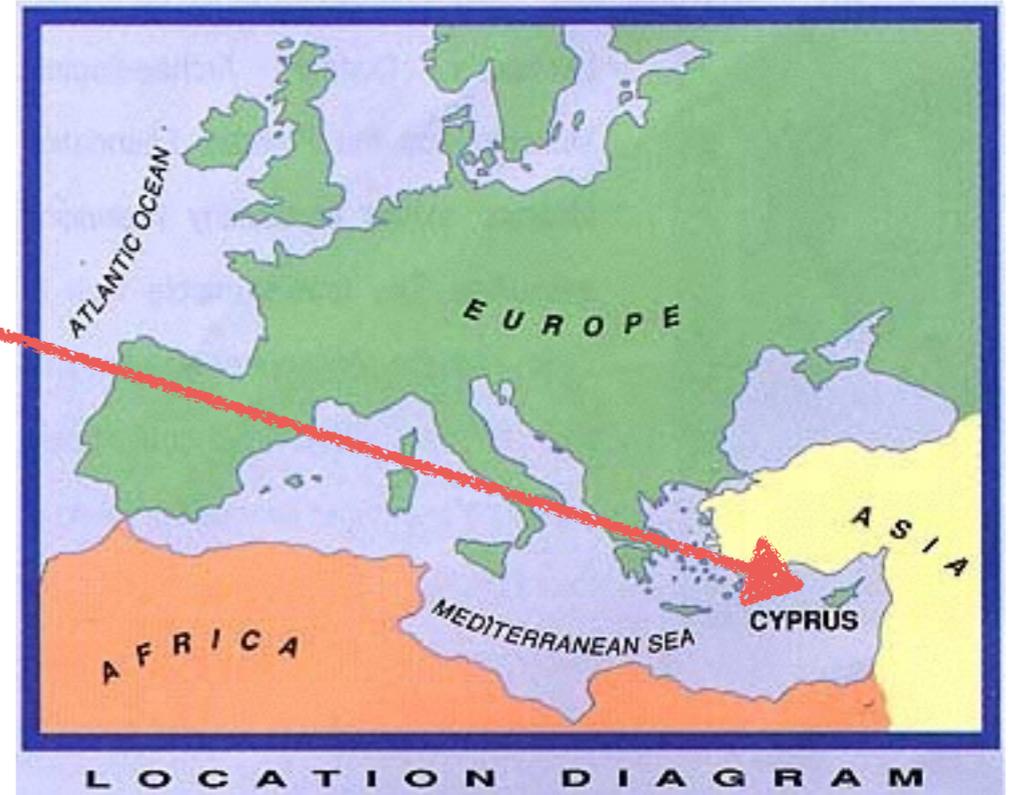


myself in 30 seconds

- born: 1983, Cyprus,
- ('**01-'03**: military service),
- '**03-'07**: Univ. Manchester, undergrad,
- '**07-'11**: Univ. of Cambridge, PhD (with Bryan Webber),
- '**11-'14**: Univ. Zürich, Post-Doc,
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my research in ~ 5 min.

- I've worked on...

2007: NMSSM Higgs bosons
(central exclusive production @ LHC).

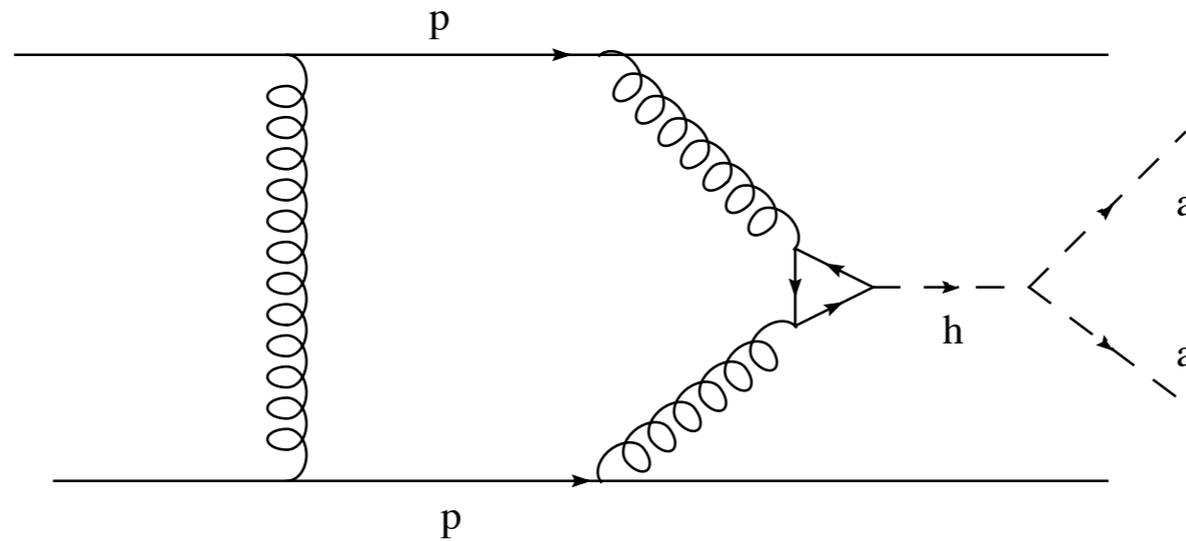


Figure 1: Central exclusive NMSSM Higgs production at the LHC.

[Forshaw, Gunion, Hodgkinson, **AP**, Pilkington, 0712.3510]

my research in ~ 5 min.

- ...and more BSM: **2008**: W-primes at NLO (MC@NLO/POWHEG)

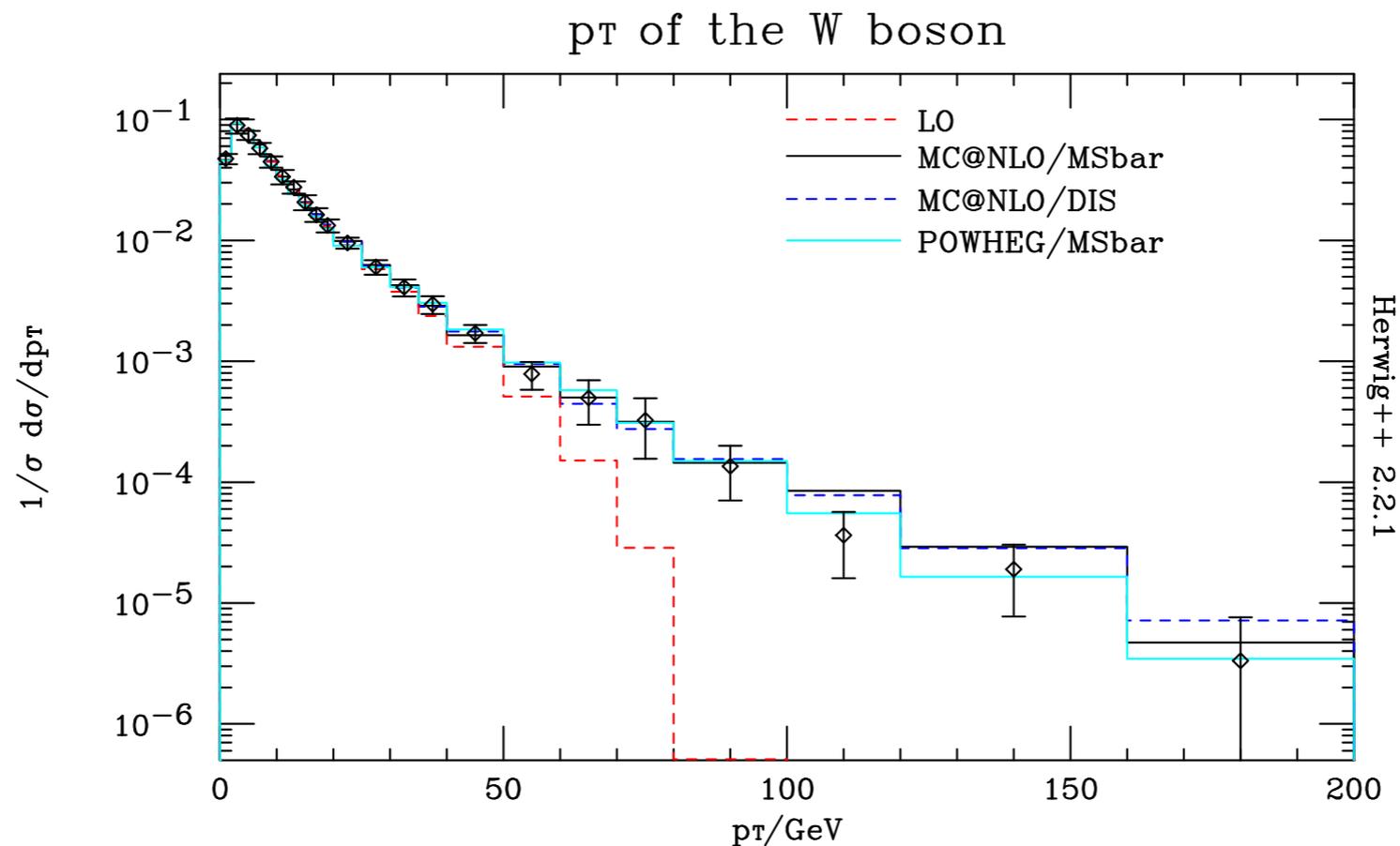


Figure 3: Transverse momentum distribution at the Tevatron obtained for MC@NLO/Herwig++ in the DIS and MSbar factorisation schemes (PDFs: cteq5d and cteq5m [36] respectively), POWHEG MSbar (cteq5m) and LO (PDF: MRST2001LO [37]), in the mass range (70 – 90) GeV.

my research in ~5 min.

- more mythical creatures...



2010: 3rd generation lepto-quarks searches
at the LHC,

[B. Gripaios, **AP**, K. Sakurai, B.R. Webber, 1010.3962]

2011: determination of the helicity structure of 3rd
generation resonances.

[**AP**, K. Sakurai, 1112.3956]

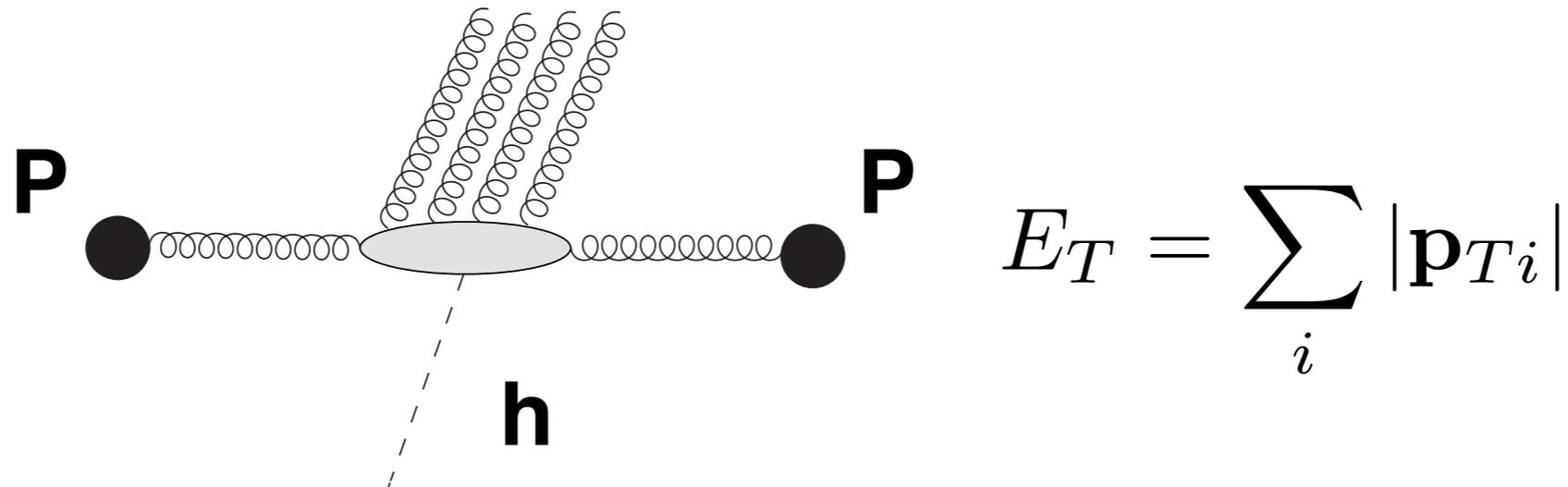
my research in ~5 min.

- QCD resummation:

2009/10: Effects of QCD on inclusive observables
(e.g. the total invariant mass)

[**AP**, Webber, 0903.2013, 1002.4375]

- Resummation of the “associated transverse energy” in Higgs boson production:



[**AP**, Webber, Smillie, 1002.4375] and [Grazzini, **AP**, Webber, Smillie, 1403.3394]

my research in ~5 min.

- **2013**: the colour structure of the the Tevatron top-anti-top asymmetry:

[Gripaios, **AP**, Webber, 1309.0810]

- **2014**: SUSY decays to Higgs bosons:

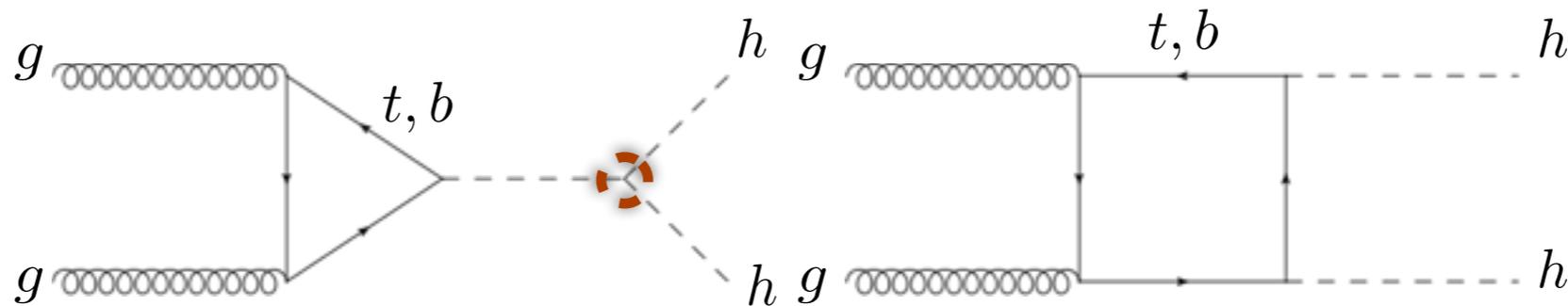
$$\tilde{\chi}_2^0 \tilde{\chi}_1^\pm \rightarrow (h \tilde{\chi}_1^0) (W^\pm \tilde{\chi}_1^0)$$

with: $h \rightarrow \tau^+ \tau^-$

[**AP**, Sakurai, Takeuchi, 1404.1077]

my research in ~5 min.

- **2012-14:** Higgs boson pair production @ LHC,
 - (and constraining the Higgs boson self-coupling)



- **searches:** $pp \rightarrow hh \rightarrow (b\bar{b})(W^+W^-)$ [AP, Yang, Zurita, 1209.1489]

use $\sigma(hh)/\sigma(h)$

[Goertz, AP, Yang, Zurita, 1301.3492]

$pp \rightarrow hh \rightarrow (b\bar{b})(b\bar{b})$

[Ferreira de Lima, AP, Spannowsky, 1404.7139]

my research in ~5 min.

- **2012-14**: Higgs boson pair production @ LHC,
- **improved Monte Carlo description** using merged matrix elements obtained via OpenLoops.

[Maierhöfer, **AP**, 1401.0007]

- **dimension-6 operator extension of the SM**: what can we learn from hh production?

[Goertz, **AP**, Yang, Zurita, 1301.3492]

my research in ~5 min.

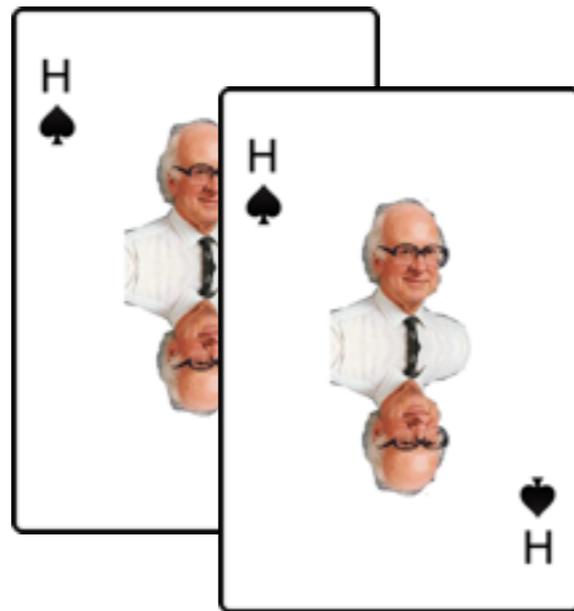
- a very brief summary:
- **collider phenomenology**, including:
 - **QCD** effects,
 - **BSM** physics,
 - Monte Carlo event generators (**Herwig++**).
- and more recently: **Higgs boson pair production**.

at this very moment:

- more on **D=6 Higgs boson pair production**,
- more on **hh+1 jet**: can we learn something more on the self-coupling?
- + interface between **MG5_aMC@NLO** and **Herwig++**
(particularly FxFx merging).

Thanks for your attention!

questions?



(with apologies to Peter Higgs)